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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/387,477	09/01/1999	Manabu Tomita	TIJ-26105	2630

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TEXAS INSTRUMENTS INCORPORATED
P O BOX 655474, M/S 3999
DALLAS, TX 75265

EXAMINER
GUERRERO, MARIA F

ART UNIT	PAPER NUMBER
2822	

DATE MAILED: 04/05/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/387,477	Applicant(s) TOMITA ET AL.	
	Examiner Maria Guerrero	Art Unit 2822	

-- The MAILING DATE of this communication app ars on the c ver sheet with the correspondence address --

Peri d f r Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 January 2002* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 3-7* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 3-7* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Pri rity under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

1. This Office Action is in response the Amendment filed January 18, 2002.

Claims 2, 8-9 are canceled.

Claims 1, 3-7 are pending.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1, 3-7 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The specification does not provide support for the new limitation "the fluorocarbon gas having the lower ratio of carbon atoms to fluorine atoms forming at least one half of the mixed gas".

Claim Rejecti ns - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

3. Claims 1, 3-4 are rejected under 35 U.S.C. 102(b) as being anticipated by Arleo et al. (U.S. 5,176,790).

Arleo et al. teaches providing a semiconductor substrate having an insulating layer, etching the insulating layer using a mixed of fluorocarbon gases that have different ratios of carbon atoms to fluorine atoms (fig. 1-3, col. 1, lines 20-30, col. 3, lines 20-25, 40-50, col. 4, lines 38-55). Arleo et al. discloses the mixed of fluorocarbon gases comprises a first amount of first fluorocarbon gas with a large C/F ratio, mixed with a second amount of a second fluorocarbon gas with a small C/F ratio, the amount of the second fluorocarbon gas being less than the amount of the first fluorocarbon gas (col. 3, 20-52, col. 4, lines 40-50, col. 6, lines 1-5). In addition, Arleo et al. teaches using C_4F_8 as first fluorocarbon gas and at least one of CHF_3, CF_4 as a second fluorocarbon gas (col. 3, lines 20-25, 40-52, col. 8, lines 9-17, col. 11, lines 34-45). Arleo et al. discloses the insulating layer being plasma etched, the semiconductor substrate having a lower conducting layer (fig. 1-2, col. 3, lines 5-20, col. 11, lines 5-10).

4. Claims 1, 3 are rejected under 35 U.S.C. 102(e) as being anticipated by Liu et al. (U.S. 5,906,948).

Liu et al. teaches providing a semiconductor substrate having an insulating layer, etching the insulating layer using a mixed of fluorocarbon gases that have different ratios of carbon atoms to fluorine atoms (Abstract). Liu et al. discloses the mixed of fluorocarbon gases comprises a first amount of first fluorocarbon gas with a large C/F ratio, mixed with a second amount of a second fluorocarbon gas with a small C/F ratio, the amount of the second fluorocarbon gas being less than the amount of the first fluorocarbon gas (col. 3, lines 20-30). Liu et al. teaches using C_4F_8 as first fluorocarbon gas and CHF_3 as a second fluorocarbon gas (Abstract, col. 3, lines 20-30).

5. Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Tang et al. (U.S. 6,211,092).

Tang et al. teaches providing a semiconductor substrate having an insulating layer, etching the insulating layer using a mixed of fluorocarbon gases that have different ratios of carbon atoms to fluorine atoms (Abstract).

Claim R j ctions - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 3-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tang et al. (U.S. 6,211,092) in view of Miyazaki et al. (U.S. 5,804,878).

Regarding claims 3-7, Tang et al. teaches a plasma-etching process using fluorocarbon gases such as, C_4F_8, CHF_3, and CH_2F_2 (Abstract, col. 6, lines 5-15). Tang et al. discloses using silicon oxide using TEOS and spin-on glass layers (col. 2, lines 10-12, col. 14, lines 40-50). Tang et al. teaches as conventional in the art, advanced integrated circuits contain multiple wiring layers separated from the silicon substrate and from each other by dielectric layers; several layers of metallization with intervening inter-level dielectric layers are required; and contact or via holes are filled with a conductor typically aluminum col. 1, lines 35-55).

Tang et al. fails to show the lower conducting layer having a titanium nitride layer, a layer of aluminum, a titanium layer and a titanium nitride layer stacked in that order. However, Miyazaki et al. shows the use of these materials as conventional in the art (Abstract, fig. 1 (D), col. 2, lines 1-12, 30-40, col. 4, lines 45-60).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to include Miyazaki et al.'s teachings in Tang et al.'s process.

The modification would provide a process that can be applied to a dual damascene structure and to other multi-layer dielectric structures.

In addition, the amount of etching gas is considered to be obvious, since this is a variable of art that is subject to routine experimentation and discovery of an optimum value for a known process is obvious. In re Aller, 105 USPQ 233 (CCPA 1955). In re Geisler, CA FC, No. 96-1362, July 7, 1997.

Response to Arguments

7. Applicant's arguments with respect to claims 1, 3-7 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maria Guerrero whose telephone number is 703-305-0162.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr. can be reached on 703-308-4940. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7382 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

MG
MG
April 4, 2002

Carl Whitehead Jr.
CARL WHITEHEAD, JR.
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800